IN THE CLAIMS:

Kindly cancel all pending claims without prejudice.

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42. (Canceled)

Please add the following new claims 43-50.

43. (New) A method of estimating an amount of a tape of known thickness on a tape reel in a tape system, said tape reel defining a minimum tape-pack radius, said method comprising the steps of:

measuring at intervals an angular position of said tape reel as said tape reel is rotated by said tape system;

determining at said intervals a measured length of tape transferred onto or from said rotated tape reel;

providing, in a Kalman filter employed in a processor, a mathematical model of dynamics of said tape system that affect rotation of said tape reel and transfer of said tape onto or from said tape reel, said mathematical model configured to estimate said amount of tape on said tape reel and an associated error variance; and,

estimating for selected intervals, by said processor employing said Kalman filter, said amount of tape of said known thickness on said tape reel defining said minimum tape-pack radius and said associated error variance based on sequential angular-position measurements of said tape reel and the measured length of tape that is transferred onto or from said tape reel between said sequential angular-position measurements.

44. (New) The method of claim 43, wherein a tape-pack radius is estimated to provide said estimated amount of tape on said tape reel.

45. (New) The method of claim 43, wherein said tape system includes a capstan that engages said tape and is rotated to transfer said tape onto or from said tape reel, and said step of determining at said intervals a measured length of tape transferred onto or from said rotated tape reel, further comprises the step of:

measuring a change in angular position of said capstan as said tape is transferred onto or from said tape reel during said intervals.

46. (New) The method of claim 45, wherein said tape system includes a tape-tension arm that engages said tape and is angularly displaced by changes in tension in said tape which alter a tape-path length along which said tape is transferred onto or from said tape reel, and said step of determining at said intervals a measured length of tape transferred onto or from said rotated tape reel, further comprises the step of:

measuring a change in angular position of said tape-tension arm as said tape is transferred onto or from said tape reel during said intervals.

47. (New) A system adapted to estimate an amount of a tape of known thickness on a tape reel in a tape system, said tape reel defining a minimum tape-pack radius, said system comprising:

a first transducer operatively associated with said tape reel to measure at intervals an angular position of said tape reel as said tape is transferred onto or from said tape reel by said tape system;

a second transducer operatively associated with said tape to determine at said intervals a length of tape transferred onto or from said rotated tape reel; and,

a processor employing a Kalman filter configured with a mathematical model of dynamics of said tape system that affect rotation of said tape reel and transfer of said tape onto or from said tape reel, said processor employing said Kalman filter for estimating said amount of tape of said known thickness on said tape reel defining said minimum tape-pack radius based on sequential measurements of said first transducer during a selected time interval and sequential measurements of said second transducer during said selected time interval.

48. (New) The system of claim 47, wherein said tape system includes a cylindrical member that engages said tape and rotates as said tape is transferred onto or from said tape reel, and said second transducer measures at said intervals an angular position of said cylindrical

member that rotates as said tape is transferred onto or from said tape reel to determine said length of tape transferred onto or from said rotated tape reel.

49. (New) The system of claim 48, wherein said cylindrical member is a capstan that engages said tape and is rotated to transfer said tape onto or from said tape reel.

50. (New) The system of claim 47, wherein a tape-pack radius is estimated to provide said estimated amount of tape on said tape reel.